EVALUATION OF THE USAID DAIRY COMPETITIVENESS PROJECT (UDCP)

MILK QUALITY EXPERT FINDINGS

February 2011

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MILK QUALITY EXPERT FINDINGS

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Executive Summary

The impact of the UDCP initiative was investigated by Mr. Cassidy and Dr. Paterson during the week of the 6th to the 11th February 2011. Paterson was employed specifically to investigate the milk quality aspects, but as quality is inter-linked to all aspects of the project, comments have been made regarding the whole of the milk supply chain including production, veterinary, financial and institutional aspects as well.

The technical knowledge required for the evaluation of milk quality is available in Rwanda and the present laboratory equipment is adequate for performing the majority of tests. However, consideration is being given to replace some of the equipment so that the Dairy Quality Assurance Laboratory can cope with a greater quantity of samples once it moves to Kigali. In addition, it would be desirable to have equipment to measure antibiotic residues such as penicillin and tetracyclenes.

The training given to the milk producers to improve the quality of milk has had a definite impact on the producers' awareness of milk quality and their introduction of desirable milking and milk handling techniques. This has resulted in the improvement in milk quality. The positive impact of this on the local consumers must not be underestimated, as they consume the majority of milk produced. This alone can be motivation for the continuation of the UDCP effort at the production level.

The introduction of can washing facilities has not been generally accepted by the producers but it is expected that once practical liquid detergents are made available these facilities will be fully utilized by the producers.

The testing of milk at MCC's is not consistent. At the best, the testing consists of the alcohol test for acidity and a hygrometer test for water contamination. The standard of this testing will improve if there is a milk price incentive for quality milk or statutory intervention is implemented. However, the training of **consumers** in milk quality could be extremely important in initiating a strong 'pull-through' effect in the milk value chain.

The UDCP initiative at producer level has been very effective in increasing milk production. This has been primarily due to the introduction of supplementary feeding with molasses and ammoniated roughage combined with advice on cow health. This initiative must continue. It is unfortunate that the local, and possibly also the urban consumers, do not have the financial capacity to take up all the increased production resulting from this initiative. Possibly efforts at marketing could remove this 'surplus'. Alternatively the Rwandan economy will expand and this additional milk will be purchased. It is also expected that supplementary 'licks' or 'blocks' that are brain resistant could become available in the future providing the required nutrients during the winter months. Summer supplementation will also need to be considered. There needs to be a national strategy to institute testing and inoculation of cows for Tuberculosis and Brucellosis.

The majority of the present and planned MCC's is, and will be, overcapitalized. The loans by the Rwandan Development Bank are expected to be paid back over a period of 5 years at an interest rate of 12%. This will put so much financial pressure on the producers that they are likely to (will) abandon supplying the MCC's. This will cause a total collapse of the present emerging milk supply chain. This challenge will need to be addressed.

The efforts by the UDCP in developing the institutions representing the producers and milk retailers has been exceptionally valuable to the development of the milk industry and it is vitally important that these institutions continue to be supported by the UDCP for at least a few more years into the future.

It is recommended that the UDCP continue support services to the select producers without increasing the numbers serviced, continue support of the MCC's by reducing the cost to the members, become involved in educating the consumer regarding milk quality and introduce a traceability program where milk sellers demand quality milk from the producers, and not withstanding this, encourage government to bring in statutory control of milk quality.

Introduction

The USAID Dairy Competitiveness Project (UDCP) has the objective “To expand dairy sector related economic opportunities and improve wellbeing in rural areas by increasing the competitiveness of the Rwanda dairy sector”. This objective has been directed at “persons living with HIV/AIDS (PLWHAs) and seeks to address poverty, nutrition and the health of rural smallholder dairy producers, as well as orphans and vulnerable children (OVC)”.

The purpose of this investigation was to evaluate the dairy development activity of the UDC project with the focus on “milk quality standards and protocols at the smallholder, collection stations and processing centers” and provide recommendations for the continuation, or not, of this project.

Methodology/Approach

A comprehensive review of literature was made, in the time available, prior to visiting Rwanda. In addition, milk quality assurance programs that the author has been involved with, in New Zealand, Europe, Ethiopia, Sudan, Mauritania, Kenya, Swaziland, Malawi, Zimbabwe and South Africa, were revisited in preparing for this assignment.

On arriving in Rwanda, discussions were held with Mr. Cassidy on his findings to date on the UDCP and the author was presented with a number of useful reports on the activities of the UDCP. Further discussions took place regarding these documents.

These discussions were followed by meetings and visits to a number of organizations and people involved with the project. This program is summarized below:

Monday, February 7, 2011

1 Eric Ngaba – Rwanda Bureau of Standards (RBS).
2 African Development Bank, presentation to the Dairy working group.
3 Vestine Musanagire - Microbiological laboratories – Rwanda Veterinary Laboratories.

Tuesday, February 8, 2011

1 Dr. Theogene Rutagwenda – Rwanda Animal Resources Development Authority (RARDA).
2 Gilbert Rubangisa – German Aid (GIZ) previously GTZ.
3 Erik van Waveren – Netherlands Development Organization (SNV). Innocent Matvishu – Livestock specialist.
4 Venuste Nyirihene – Rwanda Development Bank (BRD).

Wednesday, February 9, 2011

1 Dr Nathaniel Makoni – American Breeder Services (ABS).
2 Ndavi Muia – Technoserve and East African Dairy Development (EADD).
3 Frederik Karangwa – Rwanda Milk Sellers Association – AGM.
4 Ndatemwa Collection Center (No.1) Charles Kabayiza.

5 Farm No.1 – Lady
6 Farm No.2 – Charles Kabayiza.
7 Rwimbogo Collection Center (No.2)

Thursday, February 10, 2011

1 Eisangano Collection Center (N0.3) – Mugabe
2 Farm No.3 – Joseph Amia
3 Eragic Artificial Insemination Station – Titus Mudishai (RARDA). ABS – Dr. Humphrey Hamudikuwanda.
4 Dairy Quality Assurance Laboratory (DQAL). David Mupenzi.
5 Discussions with Dermot Cassidy.

Friday, February 11, 2011

1 Presentation at the US Embassy to an invited group.

The contribution by all those interviewed is highly appreciated. The openness of the discussions was extremely valuable especially in assessing the value of the UDCP efforts as perceived by those interviewed. Their comments have been summarized below because they form the basis of this investigation. My personal comments have been added.

1. Rwanda Bureau of Standards (RBS) - Eric Ngaba

- The East African standards for pasteurized milk are the same as those standards for Rwanda but local standards are still used.
- It is very difficult to maintain the cold chain for rural milk.
- The RBS has a very good relationship with the Rwandan National Dairy Board.
- The RBS is short of staff to implement their standards.
- The people in the supply chain will need to “Adopt or Adapt” to the standards.
- Their laboratories are fully equipped to evaluate everything related to milk quality.
- Those involved in certifying standards must be separated from the inspectors.
- The National Standards were only introduced two years ago and therefore it is early days to expect the standards to be accepted so soon.

Comment: It is appreciated that the development of the formalized dairy industry in Rwanda is in its infancy.

2. Presentation by the African Development Bank to the Dairy Working Group.

- The Milk Collection Centers (MCC) will be managed by the communities.
- The Government should sell the MCC's to the communities so that they have ownership.
- The funds allocated to the development program per MCC = $75,000, Water = $72,000, Marketing = $24,000, Slaughter = $2,000.
- In addition funds will be available for Vet clinics (2), AI center (1), Rural roads (150km) and 5 Quarantine stations.

Comment: Hypothesis "The infrastructure will cost more than the value of the milk collected".
Comment: "Will the community be involved in the building of the infrastructure so that they gain from being paid and also have ownership of 'their' MCC"?

3. Government Veterinary laboratories - Vestine Musanagire

- Inspectors in each of the 416 Sectors.
- These inspectors inspect, they do not advise!!
- Inspectors have the right to close or stop anyone contravening the standards but at this stage do not apply this right.
- They work closely with the RBS.
- 361 of the inspectors have their training are financed by Land o Lakes.
- The training by Land o Lakes has been very good and they need considerably more training.
- The inspectors are using Rwanda standards in their inspections.

Comment: The system is not delivering vitally important information regarding the inspectors' observations.

4. Rwanda Agricultural Development Authority (RARDA) –Dr. Theogene Rutagwenda.

- Has worked closely with the USAID program.
- The country is under stocked.
- He has encouraged zero grazing and the one cow one family program'.
- The school feeding schemes will utilize the milk from the MCC's.
- The MCC's have helped the marketing of milk.
- There is presently no punishment or reward for bad or good milk.
- The UDCP has made a great contribution by organizing the development of the Dairy Board.
- The UDCP has brought the key players in the milk industry together which is vitally important.
- This is the beginning of an integrated commodity chain.
- If there is an incentive for milk quality then milk production will become competitive.
- The best intervention will be to engage the private sector in the milk supply chain.
- The co-operatives should be encouraged to become business orientated.
- He was worried that the various NGO's servicing the milk chain were not co-operating but has no concerns now.
- There is no hope that large milk producers will emerge from those producers supporting the MCC's because the land is not available for this.
- There are only a few (4) farmers who have holdings of as much as 60ha.
- Feeding of cows is the number one factor that will give improved productivity.
- They are encouraging both Friesland (Holstein) and Jersey breeding.
- The 100,000 cows that were donated to the rural people were all TB and Brucellosis free.
- TB is monitored in the slaughter houses.
- Quarter Evil (Clostridium Spp) is vaccinated for.

Comment: It is questionable whether the country is under stocked. With the extremely high human population there is probably not a great amount of grazing left for livestock. It is vitally important to estimate the actual stocking rate which can then be used to estimate if there is enough grazing left for improving milk production from the natural grazing.
Comment: It is important to consider a national policy to test and control TB and Brucellosis in

the national herd. This is not in place at the moment and unless the herds are certified free of these diseases they cannot be said to be competitive.
Comment: Someone must be responsible for demonstrating the difference in milk production between the Friesland (Holstein) and Jersey breeds at a low level of feed availability, as is the norm in Rwanda, and will be the norm for the foreseeable future.

5. German Aid Program (GIZ, previously GTZ) - Gilbert Rubangiza.

- Their objective is not to increase milk production but encourage new business development.
- They support RBS to train small business communities.
- They help businesses to make contact with the right government departments.
- They do not want to duplicate the efforts made by USAID.
- They are indirectly involved in milk production by "supporting the supporters" i.e training.
- Local demand for milk is much greater than production (possibly implying that they are not particularly interested in milk because Rwanda will never be a milk exporter).
- Their support for the businesses will become more important as the Rwanda economy grows.

6. Dutch Aid Program (SNV) - Erik van Waveren

- They have completed a detailed study on the Rwanda dairy industry.
- They are interested in supporting the dairy industry.
- They are interested in developing the private sector.
- They use a market based approach.
- They bring advice and not money.
- They help businesses access funding.
- They are working with Land o Lakes and do not want to duplicate their efforts.
- The excellent work that Land o Lakes is doing must continue.
- The National Dairy Board needs strong Vision and Mission statements and related strategies to achieve these.
- They like to build up the capacity of local organizations through providing technical and financial information.
- They feel that there should be a Top - Down approach to the MCC's.
- They believe the USAID program is good and they are very happy to work along with them.

Comment: The SNV are sincerely interested in working with the UDCP but not at the production level.
Comment: Their Top-Down approach to the MCC's may be important to consider.

7. Rwanda Development Bank (BRD) - Venuste Nyirihene (Resource Mobilization and Special Projects Unit).

- They are very involved in the financing of the MCC's.
- Each MCC co-operative must provide Rwf 10 million to the development of an MCC and then the Rwandan government will provide a grant of Rwf 33 million and the BRD will provide a loan of Rwf 35 million.
- The BRD loan is provided at an interest rate of 12% with a repayment rate of 5 years.

- The 21 MCC's developed so far have cost Rwf 80 million (US$ 160,000) each.
- The high cost of water and electricity was emphasized.

Comment: It is very unlikely that the BRD loan at 12% interest is likely to be repaid by any of the MCC co-operatives because it will reduce the members' actual milk price to a very low unacceptable level.
Comment: The high cost of developing an MCC must be reconsidered.
Comment: The high level of the interest charged must be reconsidered.
Comment: The producers may have agreed to have MCC's developed but did they agree to the development cost they have to repay?

8. TechnoServe - Ndavi Muia (Also EADD).

- Vision is "Business solutions to poverty".
- Their objective is to double the income for the 179,000 milk farmers across three countries (Kenya, Rwanda and Uganda).
- They have a number of partners including Heifer International, TechnoServe and then at a third level ICRA and ILRI.
- Heifer International works on the ground up to the MCC level.
- TechnoServe provides business services at the MCC to Processor level.
- ILRI provide the research and do not work at ground level.
- Funding of the MCC's in Kenya is working well.
- Funding in Uganda has a few problems.
- Funding in Rwanda is just beginning.
- MCC's need a contractual agreement with the processors.
- The MCC's need to be part of a business Hub to be successful.
- The biggest challenge in the milk supply chain is around the MCC's and involves ability and integrity.
- The consumer just boils low quality milk so is quality a problem?
- The future of Land o Lakes is in co-coordinating the milk supply/value chain.

Comment: Their comments on MCC's, contractual agreements, business hubs and the future role of Land o Lakes is worth serious consideration.

9. American Breeder Services (ABS) - Nathaniel Makoni.

- Nyanze milk processors were taking 10,000litres per day but this appears to have dropped.
- Water harvesting is of major importance (No.1) in the production of milk.

10. Rwanda Milk Sellers Association - Frederick Karangwa

- This was a regional meeting and according to the number of members attending and the enthusiastic discussions there was strong support for the association as well as an indication that there was a very important need for the association.

11. Ndatemwa Collection Center (No.1) - Charles Kabayiza.

- He referred to the grading system for milk based on total bacteria counts. Grade 1 being less than 500,000, Grade 2 being 500,000 - 1 million, Grade 3 being 1million to 5 million

and Grade 4 being greater than 5 million.

- Although he had put a lot of effort into improving his milk quality, and had done so (as shown by tests done on his milk through a laboratory), he was receiving the average price for milk in the area of Rwf 150 to Rwf 160 per litre.
- The demand had dropped for their milk at their MCC.
- Originally 80 farmers had delivered milk to the center and now it was only 25.
- Only 300 litres had been collected that morning.
- Four people were employed to run the MCC.
- Test for water contamination is made using a hygrometer measuring milk density and a test for acidity is made using the alcohol test.
- The seasonal price structure varies from as low as Rwf 100 per liter during the rainy season to as high as Rwf 300 per liter in the drier months.

Comment: Why are the milk sellers not buying from an obviously motivated group of quality milk producers?

12. Farm No.1 - a lady.

- One cow, one suckling calf and one yearling heifer.
- All in exceptionally good condition.
- Well fed on a zero grazing system.
- Cow is taken to the bull when showing heat and therefore no artificial insemination is used.
- Cow produces a calf and 6 liters a day.

Comment: The stock is kept on concrete under a tin roof. This structure is a big capital investment and cattle do not like lying on concrete. Cows are much happier tied under a tree. Usually a structure of this sort is typical of intervention by someone (often government officials) who advises it. However, her stock was in fine condition!

13. Farm No.2 - Mr Kabayiza.

- 20ha of grazing.
- Producing 40 liters per day from 6 cows.
- A very well developed dairy.
- Little demand for his quality milk.

Comment: The grazing was deteriorating as shown by the invasion of the Sporobolis grass species. There was also no evidence of Red Grass (Themeda triandra), the desirable species for the area, in well managed grassland. Star Grass (Cynodon plectostachyus) was developing in a relatively large area around the dairy as would be expected due to the higher soil fertility in this area. Unfortunately this valuable grass was not being grazed correctly because there were no camped off areas where the cattle could be forced to eat the grass right down and thus develop highly nutritious short grazing. The present Star Grass was far too high to be of use. This indicates that there is a role for training in grass management (and also protecting the natural grass resource).

14. Rwimbogo Collection Center (No.2).

- 144 members.
- The Coop has a contract (unwritten) with a buyer who is a milk seller in Kigali.
- 2,000 liters collected and sold daily.
- Uses a generator to bring the temperature down to 2 to 4 degrees centigrade in four hours.
- Alcohol and lactometer testing (Although there was no obvious evidence of this).
- Milk price = Rfw 150 in summer.
- The road to this MCC is in bad condition and yet they sell all their milk and will be expanding once they have another milk tank.
- The Coop has purchased a tractor and equipment which is hired out to members. Tractor @ Rfw 42,000 per ha (US$84/ha)
- The members have been selling milk for a long time (Since 1997).

Comment: Possibly those well-established milk producers have the contacts to sell their milk while new MCC's, like the previous one, have trouble entering the market, which could be a warning to the large number of new MCC's coming into the market.

15. Eisongano Collection Center (No.3) - Mr Mugabe.

- Collection of milk is from a large area covering 3 sectors.
- Collect 3,000 liters per day.
- Milk price = Rfw 150 per liter and Rfw 24 removed for running expenses of the coop leaving a net price of Rfw126 per liter.
- The Rfw 24 is made up of 10f for Diesel, 10f for the coop and 4f for the Union.
- 270 members.
- 6 people employed.
- The Resazurin test is carried out twice a week to measure the keeping quality of the raw milk.
- Sometimes the alcohol test is used but this is unusual.
- Land o Lakes does a complete test at the local laboratory now and again.
- Even though they manage to sell all their members milk they state that marketing of milk is a major problem in the whole district.
- This MCC was given to the community through a grant provided by the UNDP in 1997 and therefore there is no repayment cost.
- The MCC is simply one room and a verandah.
- The collection of milk and testing is done on the verandah.
- Now that the MCC is going well they intend adding onto the building.
- Land o Lakes and Heifer International have helped the cooperative considerably.
- Their generator is expensive and they hope that cheaper electricity will soon be supplied.
- They stated categorically that they will appreciate continued support from USAID.
- They aim to get their total bacteria count down to 800,000.
- Water has been supplied to them by Land o Lakes.
- They will only start using the water washing facilities, provided by Land o Lakes, once a soap is supplied that can be rinsed off easily.
- They believe that when their milk quality improves they will receive an increase in the price of milk.

- The difficult months for the producers are the months of August to October when there may be a shortage of water.
- During these months it is critical to have conserved water for the milking cows.
- The members have contributed to their coop and have purchased a tractor which they charge out at Rfw 45,000 per ha for ploughing.
- Nonmembers pay Rfw 55,000 per ha.
- The Alpha Laval milk tank was paid for by the United Nations fund.

Comment: The MCC is very successful.
Comment: The MCC was paid for by a grant and donations.
Comment: The MCC building is simple.
Comment: The quality of the milk is still not up to processing (UDCP) standards.

16. Farm No.3 - Joseph Ntiyamira.

- Had six head and had to sell two to pay for a bio-gas unit.
- Now has 2 bulls, one heifer and one cow in-milk, all of which are Ankole cattle.
- Has 3ha landholding.
- Has had great success with feeding supplementary molasses (USD$ 100/ton) and urea treated stover. Greatly increased milk production.
- Holstein semen used.
- Not selling any milk because it is used for household consumption.

Comment: Important to note the reality of having 6 head of stock and no milk for sale.

17. Eragic AI Cooperative - Titus Mudishai - Dr Humphrey Hamudikuwanda (ABS).

- Started 2006.
- Privatized and subsidized by RADA.
- Now has 41 inseminators.
- They are service providers for the area supported by ABS.
- ABS staff also provides animal husbandry advice.
- ABS provides semen to producers and work closely with the MCC.
- They charge Rfw 1,500 per insemination.
- They also provide synchronization of cow cycles and pregnancy testing services.
- Nitrogen is provided by RADA.

Comment: A vital service for the smallholder farmer.

18. Dairy Quality Assurance Laboratory - David Mupanzi.

- An independent laboratory.
- Provides a private service for testing milk quality.
- Provides tests for bacterial counts, Mastitis milk, major milk components and (antibiotic residues?).
- They work with the MCC and supported by Land o Lakes and also by the Gates foundation.
- Presently used by 8 MCC's with a further 8 possible MCC’s joining.
- They take samples from each MCC twice a month and report back on their findings.

- Initially the test results gave total bacteria counts of 35 million.
- When recently separating milk into two containers for good and bad milk the bacteria counts were down to 900,000 and 6.5 million respectively.
- The laboratory does need a somatic cell counter and will be attempting to access this equipment.
- They do have a Cryoscope for measuring the freezing point of milk, testing for milk adulteration.
- They do need equipment for measuring the presence of antibiotic residues including specifically Penicillin and Tetracyclenes.

Comment: These laboratories are equipped with very good equipment for measuring the quality of milk. Some of the equipment could be updated, as recognized by the laboratory manager, and there are a few pieces of new equipment that would be useful but not absolutely essential at this stage. The manager has the technical skills to carry out the required tests competently.

Analysis and Conclusions

Introduction

The meetings with 18 individuals and groups, representing the milk supply chain in Rwanda, resulted in the summaries presented above (Section 3). These summaries are expected to be fairly representative of the present situation in the milk supply/value chain in Rwanda. The conclusions presented below are deducted from the information presented at these 18 meetings.

Standards and Protocols

The standards and protocols being promoted by the UDCP are appropriate to the needs of Rwandan milk processors for the detection and control of contaminants in raw milk supplies sourced from smallholders, through milk cooling centers. However, these standards and protocols are not being attained at the MCC's. A few of the smallholders are achieving the required standards but as there is no premium paid for quality milk, the greater majority of the milk delivered to the MCC's is bulked together resulting in an average total bacterial count (Approximately 14 million) which is well above the minimum for processing milk (500,000).

Alternative Procedures

The procedures promoted by the UDCP are the correct procedures for providing quality milk to milk processors. These procedures have been tested throughout the world and are widely recognized as being necessary for processing milk. Alternative procedures are not worth considering for the processors.

In Rwanda, only a small percentage of milk is actually sold through the milk processing plants. The greater majority of milk produced in the rural areas is sold in the rural areas. Thereafter, a certain amount is sold through the small milk outlets which are situated mainly in Kigali. The milk sold in the rural areas and from the small milk outlets is sold as it comes. There is no premium paid for quality milk. As it is stated "milk is milk" and a set price is paid for this milk. Presently the producer price is approximately Rfw 150 per liter. As there is no price incentive for 'quality milk' it is unlikely that producers are going to go to the bother of complying with recognized standards for milk quality.

Nevertheless, the training made available through the UDCP has made the producers aware of the need to consider and understand the importance of producing quality milk. This has definitely had an effect on the quality of milk produced at the farm level by those farmers involved in the UDCP program.

At the level of the milk collecting center there has also been a positive effect of the UDCP program, but it is obvious that the promoted standards are not being applied at the MCC's. Some of the milk delivered to the MCC was not tested at all. Sometimes tests were made for acidity using the alcohol test and more often the milk was tested for added water. At one MCC the milk tank was tested twice a week with the Resazurin test, for lasting ability, which is a good step in the right direction towards acceptable milk quality. But it is necessary that individual milk production is tested, as poor quality milk is mixed with low quality milk in the tank before applying the Resazurin test. In South Africa the Alizarol test is applied to the milk of individual milk producers before their milk is added to the tanker. This test is similar to the alcohol test but when alizarine is added to the alcohol it will ensure that the milk is or is not acidic and not one of the other factors that contribute to the positive reaction to alcohol alone. This test is easy to use on the farm or at the tank/tanker and could be considered in Rwanda.

It is appreciated that the Rwanda milk producers are in the early stages of a developing milk market. A quality market has existed in Kenya and South Africa for up to 50 years, and Rwanda has only been considering centralized milk marketing since 1997, so it is impossible to believe that the internationally recognized standards commonly used in Kenya and South Africa will be applicable to Rwanda at this stage.

In this case the same principles apply to producing quality milk but at this stage more appropriate standards are being used by producers and at the MCC's. From the discussions above it is clear that many of the producers are attempting to achieve an improvement in their milk quality and are generally achieving it but they are awaiting the offer of a price premium for quality milk before attempting to achieve the quality standards the UDCP would like to see. Unfortunately the UDCP can only continue with their efforts to train people in producing milk quality while waiting for a premium price to be offered. At least when the price offer arrives the milk producers will be able to react positively to it because of their training by the UDCP.

Capacity of the public sector

The discussions in point 3 above indicate that the public sector agencies have enthusiastic leaders who know what is required but obviously do not have the capacity to implement all that is required to improve milk quality. Fortunately the private sector has been encouraged, particularly by the UDCP, to become organized and play a strong role in improving milk quality. This role begins with the producer, through the MCC's and the small milk sellers to the organizations representing all sectors of the milk industry (apart from the processors). The collaboration between the public and private sectors appears to be very good. This collaboration is still in its early stages but will lead to the assurance of safe milk supplies, the expansion of the milk production and improved marketing.

Recommendations for the Future

"What is an Appropriate Vision Going Forward?"

- In the future USAID/Rwanda should concentrate on the 1200 farmers participating at the end of 2010. Do not increase the numbers serviced.
- Monitor their progress as before.
- Assume that the majority of farmers will continue participating but with a reduction of 50% of farmers over the next 5 years, leaving 600 farmers in the program.
- Of these 600 it is estimated (modeled) that 400 will be selling milk.
- It is predicted that 3% of the original 1200 (36) will have enthusiastic entrepreneurial spirit.
- These 36 should be identified from amongst the 400 as soon as possible (within the next three years) and given support to move from a smallholder dairy farmer to a fully commercialized milk producer.
- It is envisaged that these 36 will be running from 15 to 100 cows in-milk by year 5 and selling all their milk into the market place.
- With an average of 50 cows per herd producing 12 liters per day for 200 day lactation their combined production for sale will be 4,320,000 liters per year.
- This milk will meet all the hygiene requirements.
- The remaining 364 will be producing milk for sale under the present system.
- Their production is expected to be 5 litres per day for 100 day lactation from an average of 5 cows per herd giving a combined production of 800,000 liters of which 50% is available for sale which gives 400,000 liters for sale per year.
- By year ten it is expected that only two out of three of the selected 36 (24) will have succeeded financially.
- At this stage the 24 will all be running at least 100 cows in-milk with an average of 16 liters per day for 300 day lactations giving a total production for sale of 10,520,000 liters.
- It is expected that the 364 low producers will be marketing locally, possibly through their own low cost collection centers, while the 24 top producers will be selling primarily to larger urban areas.
- The top producers will not achieve this level of production without huge support in terms of expertise and finance but with their natural entrepreneurial spirit the support will be appreciated and utilized effectively.
- With an expected urban population in Rwanda of 5 million by 2020, and a desirable milk intake of 25 liters per person per year, the 24 'top producers' will alone be supplying 10% of this requirement.
- It can be modeled that 50% of these will still be producing milk at this stage but with their entrepreneurial spirit will have moved into milk processing and retailing.
- By the year 2050 these top 24 producers and their progeny could be running herds of 400 cows in-milk with even higher milk production per cow.
- At this stage they could all be in processing producing as many as 50 milk based products to supply a more sophisticated urban population.

Challenges

- The 1200 farmers should be given access to Jersey semen preferably from the southern and central African regions where the Jerseys are adapted to the environment.
- When the 36 top producers are selected they can move onto potentially higher producing semen from Dutch/British Friesian bulls.
- By 2050 these top producers will probably have the managerial ability and financial background to control the environment adequately to be able to use very high producing Holsteins.
- The 364 producers in the 'communal' sector should remain with Jersey crossed with the local zebu.
- These producers need to maintain the half bred cow which is difficult or impossible to do with only a few cows each.
- In which case there should be a program to produce these crossbred heifers and also crossbred bulls to provide the semen to inseminate the cows.
- This breed that is suited to milk production in Africa is referred to as the 'jebu'.
- These heifers can be exchanged for their 'nonproductive stock' which are utilizing the grazing that could be far more productively utilized by the crossbred cows.
- This is a method of reducing the present pressure on the grazing without referring to the undesirable term of 'destocking'.
- Training and support services are no doubt essential for the success of this program, but of over-riding importance is the availability of feedstuffs.
- Milk production can only be increased with more feed going into the system. Nb. Nb. Nb.
- What feed is available?
- For those producers who remain in the 'communal areas' they can only produce more milk if more grazing becomes available by destocking unproductive stock.
- They will also gain from the additional feed that will come from molasses, urea, Napier fodder and possibly a small amount of concentrates, but this gain will be minimal in terms of milk production, mainly due to the limitation of available natural pasture.
- The 'top producers' will require large amounts of energy and protein for their increased milk production.
- Once again what is available?
- These high producing dairy cows require 5 tons of balanced dairy feed per lactation.
- The 24 producers will require 12,000 tons of concentrate a year just for their cows production.
- Milk production internationally is more economical on artificial pastures (fertilized and irrigated).
- Are these pastures potentially available in Rwanda?
- The financial survival of the 'top producers' will depend to a large extent on the milk price.
- The ability of the urban community to demand and pay for quality milk products will depend on the national economy.
- Will the urban community have the disposable income to sustain the price of milk required by the producers?
- The present milk price to the producer is not high enough to pay for milk produced from concentrates alone.
- The price alone for concentrates will be in the region of Rfw220 per liter produced which is equivalent to the present producer price of milk?

Comment: It has been assumed above that the UDCP program is not intended to make a major impact on milk production for Rwanda but merely present a desirable example of what can be achieved by a relatively small number of disadvantaged people supported by limited inputs and sound advice from the UDCP.

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